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ORIGINAL ARTICLE

Psychological changes in Africans with kidney disease in Ghana: a comparison of haemodialysis patients and patients with chronic kidney disease not on dialysis

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ABSTRACT

Background: The prevalence of chronic kidney disease (CKD) is high in sub-Saharan Africa and affects the productive workforce. CKD has been associated with psychological problems such as anxiety and depression; however, there is little published information on the burden of psychological problems among the CKD population in African countries. Our study assessed psychological changes in two groups of patients, one group with end-stage renal disease receiving chronic haemodialysis, and a second with CKD not on dialysis.

Methods: A cross-sectional study involving patients on chronic haemodialysis and patients with CKD stages 3–5 (the "CKD" patients) was conducted at the Renal Unit of the Korle-Bu Teaching Hospital in Accra, Ghana. One hundred and sixty-eight participants (82 CKD and 86 haemodialysis patients) were recruited. Demographic, clinical and laboratory information was captured, the Revised Quick Cognitive Screening Test (RQCST) was used to assess cognitive function and the Brief Symptoms Inventory-18 (BSI-18) was used to screen for anxiety, somatization and depression.

Results: CKD patients were older than those on haemodialysis, with mean ages of 53.3 and 46.6 years, respectively. Two-thirds (113/167) were male. The median glomerular filtration rate (GFR) of the CKD patients was 21 mL/min/1.73 m^2 (interquartile range 9–34). Most of the haemodialysis patients (78.6%) were receiving two sessions of haemodialysis per week and their mean kT/V was 1.16 ± 0.23. The RQCST global scores in the two groups of patients were similar, with almost 90% of haemodialysis patients and 85% of CKD patients obtaining scores above 50. Haemodialysis patients had better scores for immediate recall memory. The haemodialysis patients also had higher BSI-18 global scores than the CKD patients (mean of 0.83 vs 0.70, $p = 0.033$). Mean anxiety and somatization scores were also higher in the haemodialysis patients.

Conclusions: Haemodialysis patients demonstrated higher anxiety and somatization scores than the CKD patients. Clinical psychological support should therefore be included in the treatment of our patients, and especially for those on chronic haemodialysis.

Keywords: chronic kidney disease; haemodialysis; psychological profile; cognitive function; sub-Saharan Africa; Ghana; depression.

INTRODUCTION

In Ghana, the prevalence of chronic kidney disease (CKD) is estimated to be 13% [1]. CKD affects mainly younger adults in sub-Saharan Africa (SSA) [2] whereas in developed countries the disease burden is highest in those aged 60 years and above [3].

Psychological problems such as impaired cognitive functioning, anxiety and depression are common in patients with CKD [4,5]. The prevalence of anxiety is high among haemodialysis patients and also in those with CKD who are not being treated with dialysis (the "CKD" patients),

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with rates as high as 52% and 54%, respectively. Psychological symptoms affect quality of life, and are associated with faster progression of CKD and higher rates of morbidity and mortality [4,5].

Risk factors for psychological problems in dialysis patients include financial difficulties, frequent hospitalization, restriction of leisure time and uncertainty about the future, among others [3-5]. Patients with advanced CKD develop uraemia, which contributes to impaired cognitive function [6] and this negatively impacts on treatment compliance leading to poor outcomes [7].

Most of the studies of psychological problems in CKD or dialysis patients have been conducted in developed countries, where patients are mostly elderly. Studies in Africans with CKD are scarce. The study reported here assessed the psychological changes and predictors of cognitive deficits in Ghanaian patients with CKD and those with end-stage renal disease (ESRD) who were being treated with chronic haemodialysis.

METHODS

A cross-sectional study was conducted at the outpatient clinics and haemodialysis centre of the Renal Unit of Korle-Bu Teaching Hospital. This is the third-largest hospital in Africa and the leading national referral centre in Ghana. It has an average daily attendance of 1,500 patients and about 300 patient admissions a day. The Renal Unit has 18 haemodialysis machines and provides treatment for approximately 260 patients with ESRD. Kidney transplantation services are also provided.

A total of 168 adult patients (82 CKD stages 3–5 and 86 haemodialysis patients) were recruited by convenience sampling from April 2014 to October 2016. Those with dementia, stroke, head injury or Parkinson's disease were excluded. All participants provided voluntary written informed consent.

A structured data sheet was used to collect socio-demographic and clinical information, including data on co-morbidities and details related to the dialysis treatment (frequency, duration, funding). For CKD patients, the CKD-EPI equation was used to estimate glomerular filtration rate (eGFR) from serum creatinine [8]. The adequacy of haemodialysis was determined using kT/V, with a value of >1.2 considered adequate [9].

The Revised Quick Cognitive Screening Test (RQCST) and the Brief Symptoms Inventory-18 (BSI-18) were used for psychological measures. The RQCST measures various cognitive domains including orientation, attention and concentration, memory, language, arithmetic, constructional apraxia, perceptual reasoning, spatial ability, and abstract reasoning. It generates four main scores: orientation, verbal, visual/nonverbal, and a global score which is the sum of the first three. A global score of 50 or above indicates normal cognitive functioning and a score below 50 signifies impaired cognitive functioning. Internal consistency reliability coefficients of 0.78, 0.84, 0.84 and 0.92 have been reported for the orientation, verbal, visual and global scores, respectively [10].

The BSI-18 is designed to screen for psychological distress [11]. It measures three aspects of distress, namely, somatization, depression and anxiety.

Data were analysed using Stata version 14.1. Descriptive statistics including frequencies, percentages, means (with standard deviations) and medians (with interquartile ranges) were determined. Differences between the two patient groups were examined using the chi-squared test for categorical variables, and Welch's t-tests or Mann–Whitney tests for numerical variables. Simple linear regression was used to identify explanatory variables to be considered for multiple linear regression for the main outcome, namely, cognitive function as measured with the RQCST global score. P values of <0.05 were considered statistically significant.

Ethical clearance was obtained from the Ethical and Protocol Review Committee of the College of Health Sciences, University of Ghana, with identification number MS-Et/M.5–P3.2/2012-2013.

RESULTS

Baseline characteristics and scores on the psychological assessments are summarized in Table 1. Of the 167 patients, two-thirds (113/167) were male. The CKD patients were older than those on haemodialysis, with median ages of 53.3 and 46.6 years, respectively. The median eGFR of the CKD patients was 21 mL/min/1.73 m^2 (interquartile range 9–34). Among the CKD patients, the proportion of patients at stage 5 was 35.8%. Approximately two-thirds of the patients had national health insurance.

Most of the haemodialysis patients (58.8%) were unemployed with more than half of them having stopped work due to their condition. The majority received two dialysis sessions per week and for most the duration of each session was three-and-a-half hours. The mean kT/V was 1.16. Dialysis treatments were funded by patients and their families/friends, through charitable donations, by non-governmental organizations, employers, or the church.

Table 1. Characteristics of CKD and haemodialysis patients at the Korle-Bu Teaching Hospital. Reported as mean ± SD, numbers (%) and median (IQR).

	Haemodialysis (n = 86) Frequency (%)	CKD (n = 81) Frequency (%)	P-value
Age (years)	46.6 ± 14.6	53.3 ± 16.2	0.006
18–39	28 (32.6)	18 (22.2)	0.075
40–60	41 (47.7)	35 (43.2)	
60+	17 (19.8)	27 (33.3)	
Missing	-	1 (1.2)	
Gender			0.704
Male	59 (68.6)	54 (65.8)	
Female	27 (31.4)	28 (34.2)	
Educational level			0.108
None	3 (3.5)	7 (8.6)	
Primary/JHS	16 (18.6)	21 (25.9)	
SHS/Vocational/Technical	32 (37.2)	24 (29.6)	
Tertiary	35 (40.7)	26 (32.1)	
Missing	-	3 (3.7)	
eGFR	-	21 (8–34)	
Dialysis frequency/week			
2 sessions	66 (76.7)		
3 sessions	18 (20.9)		
Missing	2 (2.3)		
Dialysis duration (hours)			
≤3	2 (2.3)		
3.5	64 (74.4)		
4	18 (20.9)		
Missing	2 (2.3)		
Dialysis adequacy (kT/V)	1.2 ± 0.2		
Funding of dialysis			
Self	27 (31.4)		
Company	17 (19.8)		
Spouse/parent	14 (16.3)		
Other*	25 (29.1)		
Missing	3 (3.5)		
National Health Insurance			0.051
Yes	61 (70.9)	64 (79.0)	
No	23 (26.7)	10 (12.4)	
Missing	2 (2.3)	7 (8.6)	
Number of medications	3.6 ± 2.6	4.4 ± 1.9	0.063
Family support			
Yes	53 (61.6)		
No	29 (33.7)		
Missing	4 (4.7)		
Global RQCST score	65.8 ± 10.4	63.0 ± 10.7	0.094
BSI-18 General Severity Index	0.8 ± 0.1	0.6 ± 0.1	0.033
Anxiety score	0.3 (0.0–1.0)	0.2 (0.0–0.7)	0.049
Somatization score	0.8 (0.5–1.5)	0.7 (0.3–1.1)	0.037
Depression score	0.7 ± 0.8	0.6 ± 0.6	0.124

JHS, junior high school; SHS, senior high school. *Donations from friends, NGOs, employers, churches, etc.

Table 2. Multiple linear regression illustrating the association of socio-demographic and clinical characteristics on cognitive function measured by global RQCST score among non-dialysis CKD patients.

	ß	95% CI	P-value
Age (years)			
18–39	ref		0.508
40–60	–1.3	(–6.6–3.9)	
60+	-3.6	(–9.9–2.7)	
Educational level			
None	ref		0.009
Primary/JHS	4.7	(–4.7– -13.9)	
SHS/Vocational/Technical	6.8	(–2.8– -16.0)	
Tertiary	12.6	(3.5–21.6)	
No National Health Insurance	1.6	(–3.2–6.3)	0.521
Number of medications	-1.2	(–2.3– -0.1)	0.032
Somatization score	-0.9	(–3.8–1.9)	0.514

JHS, junior high school; SHS, senior high school; ref, the reference category; ß, coefficient of the regression model.

The RQCST global scores in the two groups of patients were similar, with almost 90% of haemodialysis patients and 85% of CKD patients obtaining scores above 50. Haemodialysis patients had better scores for immediate recall memory (Table 4). These patients had higher mean BSI-18 global scores than the CKD patients (0.8 ± 0.1 vs 0.7 ± 0.1, p = 0.033). Mean anxiety and somatization scores were also higher in the haemodialysis patients (Table 1).

From the multivariable analyses for CKD patients (Table 2), educational level and number of medications were predictive of global score. Participants with higher levels of education had higher scores than those with no formal education. Additional numbers of medications taken were associated with lower global scores (Table 2).

Among haemodialysis patients, the multivariable analyses revealed educational level, duration of dialysis and somatization scores to be predictive of RQCST global scores (Table 3). Higher levels of education and longer duration of dialysis sessions were associated with higher scores, whereas higher somatization scores were predictive of lower global scores.

DISCUSSION

This study revealed good cognitive function, as assessed by RQCST global scores, in almost 90% of our patients. There were no differences in the global scores of the haemodialysis and CKD groups; however, the haemodialysis patients had better immediate recall memory. This is in line with other studies, which reported that short-term memory improves on haemodialysis [12] and which found no overall differences between patients with CKD and those on haemodialysis [13].

Factors associated with cognitive function were educational status and hours per session of haemodialysis. Other studies in haemodialysis patients have reported that patients with lower educational status have a greater likelihood of global cognitive impairment [14,15]. Our patients who had 3.5–4 hours of dialysis per session had higher RQCST scores than those receiving 3 hours or less per session. Another study, comparing 2-hour daily haemodialysis with conventional haemodialysis for 4 hours thrice weekly, did not show any differences in cognitive function [16]. Most studies have indicated no clear association between duration of haemodialysis sessions and cognitive function [15,16,26]. One investigation, however, found that achieving greater haemodialysis adequacy (kT/V > 1.2) was associated with increased risk of cognitive impairment [27].

In our study, haemodialysis patients had higher mean BSI-18 global scores than CKD patients. There was no association between depression and cognitive function. Other studies using the same scales have demonstrated that

Table 3. Multiple linear regression illustrating the association of socio-demographic and clinical characteristics on cognitive function measured by global RQCST score among haemodialysis patients.

	ß	95% CI	P-value
Age (years)			
18–39	ref		0.094
40–60	–4.3	(–8.2–-0.4)	
60+	–2.2	(–7.8–3.3)	
Educational level			
None	ref		0.001
Primary/JHS	3.7	(–9.8–17.1)	
SHS/Vocational/Technical	10.6	(–3.2–24.4)	
Tertiary	15.6	(1.6–29.7)	
Dialysis duration (hours)			
≤ 3	ref		0.004
3.5	4.5	(–4.2–13.1)	
4	11.7	(3.2–20.1)	
Funding of dialysis			
Self	ref		0.122
Company	6.1	(–0.1–12.3)	
Spouse/partner	–0.5	(–5.7–4.7)	
Other	–1.2	(–6.9–4.5)	
Anxiety score	2.7	(–0.7–6.0)	0.116
Somatization score	–4.5	(–7.7– –1.3)	0.007
Depression			
Never	ref		0.477
A little	–0.6	(–4.4–3.3)	
Moderate	–0.4	(–8.7–7.9)	
Quite a bit	–7.0	(–20.7–6.6)	
Extreme	–7.4	(–18.1–3.4)	

JHS, junior high school; SHS, senior high school; ref, the reference category; ß, coefficient of the regression model.

haemodialysis patients were more likely to develop depression than pre-dialysis CKD patients [17]. Another study, which used the nine-item PHQ questionnaire for depression, showed haemodialysis to be a significant predictor of depression [18]. We found that haemodialysis patients had higher scores for anxiety and somatization compared to CKD patients.

The prevalence of anxiety is reported to be high among haemodialysis patients, ranging from 27% to 52% [14,19,20]. High rates of anxiety have also been reported for patients with CKD [4]. These results differ from our findings, which may be due to differences in study population and the tools used to assess anxiety. Furthermore, anxiety has been shown to be a predictor of depression, poor quality

Table 4. Scores in some sub-domains of the Revised Quick Cognitive Screening Test (RQCST).

RQCST domain	Haemodialysis Mean ± SD	CKD Mean ± SD	P-value
Orientation	1.0 ± 1.3	10.8 ± 2.2	0.535
Spatial neglect	3.3 ± 1.1	3.0 ± 1.2	0.083
Memory: immediate recall	4.3 ± 0.9	4.1 ± 0.9	0.047
Spatial orientation	4.4 ± 0.9	4.2 ± 1.0	0.485
Memory: delayed recall (visual)	4.6 ± 1.5	4.3 ± 1.9	0.320
Memory: delayed recall (verbal)	2.4 ± 1.3	2.4 ± 1.3	0.865

of life, and faster rates of CKD progression [4], which may worsen the prognosis of these patients. These psychological challenges may lead to adverse outcomes such as poor quality of life and higher mortality rates. There is therefore a case for collaboration with clinical psychologists in the management of these patients, who should be screened for depression, anxiety and somatization as early detection and interventions may improve their treatment and help to prevent adverse outcomes.

Taskapan et al. reported a prevalence rate of 33% of somatoform disorders in 40 haemodialysis patients [11,21]. Somatization disorder is a predictor of poor quality of life [22] and may manifest as headaches, back pain, problems with sleep, stomach upset, and chronic tiredness [23,24], as also observed in our study.

In Africa, the cost of treatment is a source of anxiety for many patients [25]. The majority of our patients, or their relatives, funded their haemodialysis treatment. Many patients were on the national health insurance scheme, but the scheme does not cover chronic haemodialysis.

Our study has some limitations. It did not explore the effects of anxiety and somatization on long-term clinical outcomes. In addition, many potential factors which influence the occurrence of psychological problems, such as poor nutrition, socio-economic factors and co-morbid disease, were not assessed. Future studies should include the evaluation of all these factors.

CONCLUSIONS

The CKD and haemodialysis populations in Ghana appear to have good overall cognitive function. However, they are at risk of anxiety, depression and somatization disorders. Psychological evaluation and support should therefore be included in the routine management of patients with CKD or ESRD.

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